RTCA Special Committee 186, Working Group 5

ADS-B UAT MOPS (DO-282), Revision A

Meeting #19

Teleconference on 1.12.04

Proposed Changes to the Test Procedure of §2.4.2.4
Resulting from the Addition of the Requirement for
the Horizontal Eye Diagram

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SUMMARY
This Working Paper contains the proposed changes to the test procedures of §2.4.2.4 as a result of the changes previously agreed to by WG-5 for the addition of a new paragraph in §2.2.2.4, specifying the requirement for the horizontal eye diagram. Additionally, a change was required for Figure 2-11 as a result of the change from the "Root Raised Cosine" filter to the "Low Pass" filter.

is greater than +280 kHz for evenly numbered bits, and less than –280 kHz for oddly numbered bits. In the Trace D Error Summary, verify that the Deviation is a minimum of 280 kHz (rms).

2.4.2.4   Verification of Modulation Distortion (§2.2.2.4)

Purpose/Introduction:

~~These test procedures verify that the~~The minimum vertical opening of the eye diagram of the transmitted signal (measured at the optimum sampling points) **shall** be no less than 560 kHz when measured over an entire Long ADS-B Message containing pseudorandom payload data.

The minimum horizontal opening of the eye diagram of the transmitted signal (measured at 978 MHz) **shall** be no less than 0.624 microseconds (0.65 symbol periods) when measured over an entire Long ADS-B Message containing pseudorandom payload data.

This test procedure also verifies the Modulation Rate specified in §2.2.2.2, by measurement of the Eye Diagram.

Equipment Required:

The test performed in this subparagraph requires equipment described in §2.4.2.1.

Measurement Procedures:

Step 1:   Equipment Setup (§2.2.2.4)

For the test in this subparagraph, configure the Vector Signal Analyzer according to the Digital Demodulation Mode setup listed in Table 2-71. See Appendix N for the state file "UAT-DMD.STA" to automatically setup the HP89441A Vector Signal Analyzer. If the Trace C – RefLvl/Scale / Y per div[ision] setting does not equal 70 kHz, manually enter the value. On a display of 10 vertical divisions, deviations of ±280 kHz will occur at ±4 vertical divisions, respectively, from the display center.

Step 2:   Vertical Modulation Distortion (§2.2.2.2 and §2.2.2.4)

Connect the ADS-B Transmitting Equipment to the Vector Signal Analyzer through enough attenuation to present a signal at the Vector Signal Analyzer input of –60 ± 5 dBm, and initiate a series of Long ADS-B test messages each having the following message elements: the 36 bit SYNCH, followed by a 272 bit Payload having a pseudo-random series of bits which changes for each successive payload, and a 112 bit FEC as generated by the Reed-Solomon algorithm. On the Trace C "Eye Diagram," find the minimum upper crossing, and the maximum lower crossing, at the horizontal center of the display, and verify that the upper crossing minus the lower crossing is no less than 560 kHz (8 vertical divisions). Trace C should resemble Figure 2-11.

C2bw3.HGL ===> Recording Date: 12-09-03 Time: 15:40

Ch1 2FSK Meas Time
C Marker   65.00000 sym   279.07   kHz

Start: -500 msym   Stop: 500 msym
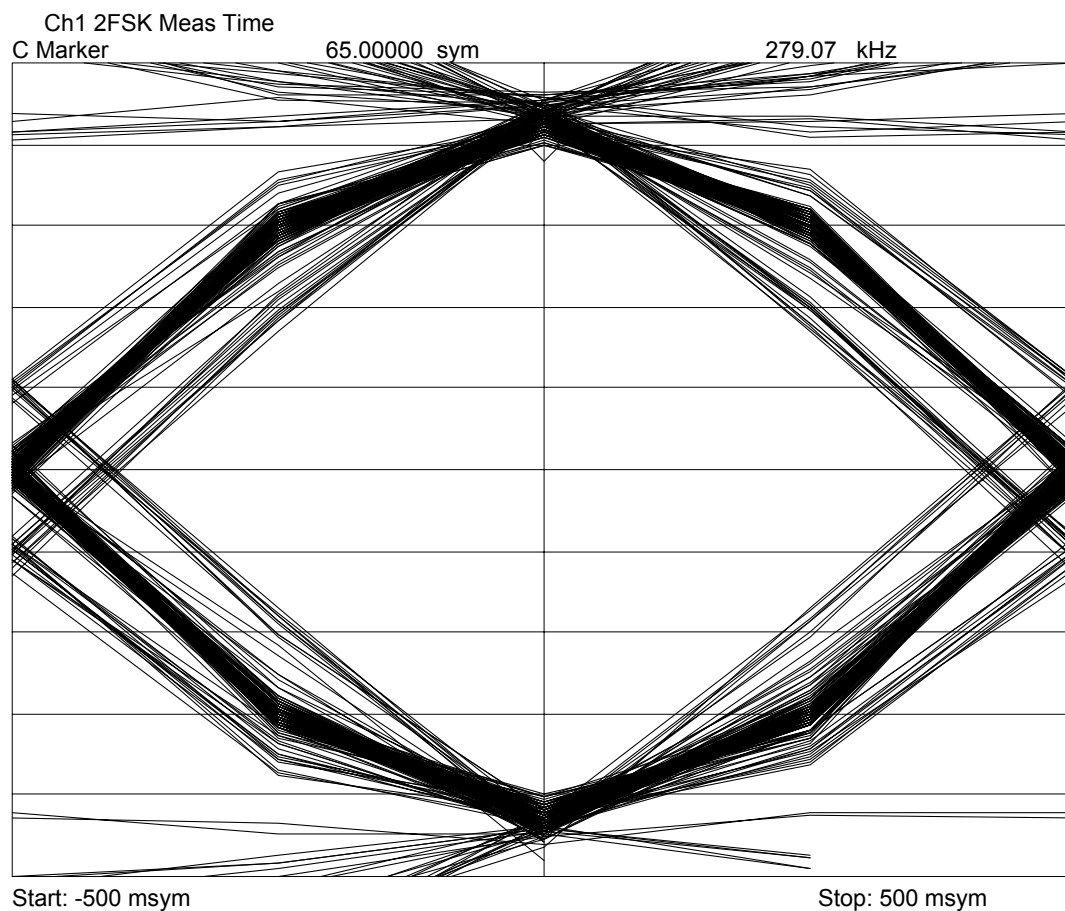
Figure 2-11: Digital Demodulation Mode – Trace C: "Eye Diagram"

Step 3:   Horizontal Modulation Distortion (§2.2.2.2 and §2.2.2.4)

On the Trace C "Eye Diagram," at the vertical center of the display, locate the innermost left crossing, and locate the innermost right crossing, and verify that the spacing between the right crossing and the left crossing is no less than 0.65 symbols in width.

2.4.2.5   Verification of Transmitter Power Output (§2.2.2.5)

Purpose/Introduction:

The Time/Amplitude profile of an ADS-B Message Transmission **shall** fall within the following limits relative to a *reference time* defined as 0.48 microseconds prior to the